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USSR Report

MACHINE TOOLS AND METALWORKING EQUIPMENT



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INDUSTRY PLANNING AND ECONOMICS

INDUSTRY MINISTER ON GAINS, GOALS OF ECONOMICS

Moscow PLANOVVOYE KHOZYAYSTVO in Russian No 7, Jul 84 pp 22-32

[Article by B. Bal'mont, minister of the Machine Tool Building and Instrument Making Industry, "Intensification of Production in the Sector"]

[Text] The decrees by the 26th party congress and of the following plenums of the CPSU Central Committee on raising the efficiency of social production and on a cardinal increase in the productivity of labor point out that these are related directly to an acceleration in scientific technological progress implemented sequentially by industry along a primarily intensive road of development.

K. U. Chernenko, General Secretary of the CPSU Central Committee, speaking at the Special February (1984) Plenum of the CPSU Central Committee stressed that "As far as the basic directions in the development of our economy are concerned, they were already defined by the party. Intensification, and the acceleration of the introduction in production of the achievements of science and technology, the implementation of large comprehensive programs -- all this, in the final analysis, must raise to a qualitatively new level the production forces of our society."*

In recent years, intensity factors continue to play an increasingly greater role in the development of the national economy and the achievement of high final results. Last year alone, the increase in the productivity of labor conditionally freed 3.5 million people and saved raw and other materials, as well as other products to an amount of about 2 billion rubles. The scales of introducing progressive equipment and highly efficient technological processes in this sector of the national economy are being expanded. Thus, in 1983 alone, the following was done at industrial enterprises: 11,000 mechanized, flow-line and automatic lines were installed; over 5000 sections, shops and production facilities changed over to comprehensive mechanization and automation.

* Materials of the Special Plenum of the CPSU Central Committee, 13 February 1984. Moscow, Politizdat, 1984, 14 pages.

The machine tool building and instrument making industry has an increasing effect on the reequipment and intensification of production in machine building. In the three years of the five-year plan period, the enterprises of this sector manufactured the following for the machinebuilding and other sectors: more than 7 billion rubles worth of metalworking equipment; 435 million rubles worth of equipment for the production of castings; 2.7 billion rubles worth of various tools and technological equipment.

In recent years, the positive effects of the intensification process can be traced in the systematic change in the capital investments structure (an increase in the share of expenditure for equipment) and industrial production funds (an increase in the ratio of the active part of the funds). Thus, working machines and equipment were 26.8 percent in January 1976 and 28.7 percent in January 1983 in the structure of the industrial-production fixed capital in the industry as a whole. The rates of increase in the active part of the funds in machinebuilding and metalworking were higher than in industry and their absolute value in January 1983 was 39.7 percent.

The national economic plan for 1984 envisions further improvement in the structure of capital investments by the state. The share of expenditures for equipment will reach almost 42 percent as compared to 39 percent for the five-year plan. Capital investments, for the Soviet Union as a whole, directed in the current year for reequipment and modernization of existing enterprises are 25.9 billion rubles, which is 2.3 billion more than envisioned by the five-year plan. In 1984, the carrying out of scientific technological measures specified in the plan to develop science and technology and directed toward raising technical standards will free about 700,000 workers conditionally in the industry.

In the current year of the five-year plan period, worker collectives in enterprises and organizations in the machine tool building and instrument making industry, according to the demands of the December (1983) Plenum of the CPSU Central Committee and the conclusions contained in the speeches of Comrade K. U. Chernenko, directed that the main thrust in their activity be on the fuller utilization of the production potential of all resources and on intensification of production. During the first quarter of 1984, the sector worked persistently to overfulfill the plans which made it possible to raise the output to 25.6 percent of the entire annual plan. A higher output rate was achieved of commercial and sold products as compared to the corresponding period in 1983. Products worth 48.5 million rubles above the plan were sold. Productivity of labor, the main indicator of production efficiency set for 1984 (5.6 percent) was overfulfilled, as well as were the adopted social obligations. In the first quarter, this indicator was 8.1 percent and was higher than the increase in wages. The increase in the productivity of labor accounted for the entire increase in the volume of production (in 1983 -- 95.6 percent). Socialist obligations were also fulfilled on reducing production costs by 0.5 percent.

With all the indicated results in the sector, available reserves for developing higher rates are still not being utilized fully. The main unutilized reserves are enterprises that do not fulfill their basic plan tasks, especially

on increasing the productivity of labor. These enterprises made up over 4 percent of all enterprises in the first quarter of 1984. The production potential is not being utilized fully. Plan tasks for raising the shift coefficient of equipment are not being fulfilled. Work on replacing universal equipment by automated equipment and on creating conditions for developing multimachine servicing is proceeding poorly.

At existing demographic conditions, with the entire specificity of problems being solved by machinebuilding sector, there is only one obvious way to solve it -- by a drastic increase in the productivity of labor, by factors intensifying production and by accelerating scientific technological progress.

Work in the machine tool and instrument making industry in the past year and in the first quarter of this year indicated that many labor collectives and the sector, as a whole, achieved high growth rates precisely because of their thrust on intense development factors. Since the start of the 11th Five-Year Plan period, implementation began in the sector of comprehensive target programs to raise the technical standard of production and, on that basis, to achieve a systematic increase in the productivity of labor and in the efficiency of production. These programs include the following: raising the technical standard and efficiency in assembling; reducing manual labor in basic and auxiliary work; developing mechanization and automation of materials handling, transports and warehousing work; developing forging-stamping, welding and casting production facilities; increasing the efficiency of utilizing material and fuel-power resources.

Experience in recent years shows the efficiency of work in raising the technical standard and intensifying production on the basis of industrial target programs. Although not everything planned for the period in the past years of the five-year plan was fulfilled in full volume, the main things can be pointed out: as a result of the implementation of comprehensive programs and other measures in the industry, the planned increase in the productivity of labor was achieved. In three years of the five-year plan period, it increased by 19.7 percent as compared to 16.8 percent per plan. The share of increase in the output of commercial products due to the higher productivity of labor increased by 87.8 percent in 1982 and by 95.6 percent in 1983. The number of enterprises that did not fulfill the plan for the productivity of labor decreased. During the 11th Five-Year Plan period as a whole, it is proposed to provide for the entire increase in production at existing enterprises by raising the productivity of labor. Moreover, a reduction of industrial production personnel is envisioned at these enterprises.

A number of basic indicators of the increase in the efficiency of production improved somewhat. Costs per ruble of commercial output decreased as compared to 1980: in 1981 to 98.7 percent; in 1982 to 96.7 percent; and in 1983 to 95.6 percent. The unit consumption of rolled stock (in tons per million rubles) in 1983 decreased as compared to 1980 by 12.5 percent and of steel castings -- by 21.5 percent.

The strengthening of the plan and state discipline, introducing order and monitoring the fulfillment of contract obligations on product deliveries made it

possible to improve the fulfillment of obligations. Product sales for the first three months of this year, taking obligations into account, were 99.4 percent of the plan.

Among the basic factors, components of production intensification, are the following:

increase in technical standards of production (introduction of progressive technological process, mechanization and automation of production); reequipping of enterprises and improvement in the structure of industrial production fixed capital;

development of centralized production facilities for manufacturing parts, units and intermediate products for general machinebuilding use;

improvement in the labor control system (scientific organization of labor, norms, multimachine servicing, brigade forms of organization and labor incentives).

The set of measures being carried out for the purpose of raising technical standards of production is very broad. By implementing the comprehensive target programs to raise the efficiency of basic technological conversions, it is envisioned in the current five-year plan period to increase the productivity of labor by 10.4 percent which is 32 percent in the general planned increase in the productivity of labor.

As a result of implementing the plan task for the past three years of the five-year plan period, over 40,000 workers were freed conditionally and 140 million rubles were saved due to reduced production costs of products. The share of workers doing manual labor was 30 percent last year as compared to 34 percent in 1980. In the remaining two years of the five-year plan period, it is envisioned to free conditionally 25,000 to 30,000 more workers due to higher technical standards of production.

Increasing the level of mechanization and automation of materials handling, transport and warehousing work, as well as replacing manual by mechanized labor are large reserves in increasing the productivity of labor.

Three leading intermediate product production facilities demand constant attention; casting forging-stamping and welding. They provide intermediate products to basic production and directly affect the saving of metals and further labor intensiveness of manufacturing parts and products as a whole. In forging-stamping production, as a result of implementing a comprehensive target program, the share of weight of stampings in the total volume of forgings from rolled stock increased from 51 percent in 1980 to 58 percent last year. The average utilization coefficient of rolled stock in forge-stamp production increased to 0.58 or by 2 percent. The volume of output of forgings per worker per year increased.

The wider use of modern cupolas with hot blasting and low-waste technological processes in casting made it possible to save over 11,000 tons of metal, 7000 tons of coke and free conditionally 2000 workers. As a result of the reequipping of foundry shops, the level of mechanization and automation of production increased to 72.6 percent in 1983.

The share of welded structures in the total volume of castings and welded structures increases systematically, it was 22.3 percent in 1983. During the past three years, series production of over 100 different welded basic units of machine tools and machines was mastered instead of the inefficient casting of intermediate products which made it possible to save about 50,000 tons of cast iron.

Intensification of production of intermediate products based on wider introduction of high productivity equipment and technology demands using corresponding measures, primarily, on specializing and concentrating production. The share of cast iron ingots produced in centralized foundries for the general production of castings for the ministry increased from 41.8 to 44.6 percent. Work in this direction will be expanded. The solution of this problem is of foremost importance in plans for the 12th Five-Year Plan.

With the gradual changeover of this sector to a primarily intensive way of development, new demands are made on capital construction planning. The necessity to provide large production increases for relatively lower volumes of capital investments determines the direction of their utilization and stipulates the improvement in their structure. Modernization and, especially the reequipping of existing enterprises become of the highest priority. Re-equipment achieves a faster increase in new capacities and pays for itself more rapidly; it supplements the machine tool park with new labor tools and renovates obsolescent and worn-out equipment. Comprehensively implemented reequipping spanning all technological conversions, is an important means for eliminating intraindustrial disproportions and bottlenecks.

Capital investments in this sector for reequipping of enterprises increase faster than for industrial construction as a whole. Their volume increased by 22 percent as compared to the 10th Five-Year Plan period (and by 72 percent for construction-installation work) and is 50 percent of general capital investments (10.5 percent for construction-installation work) as compared to 47 percent (for construction-installation work) in the 10th Five-Year Plan period.

The ministry pays special attention to increasing the share of the active part of the fixed capital of general industrial production which makes it possible to raise the mechanization of labor -- the main source of raising its productivity. Thus, the share of the cost of machines and equipment increases systematically as follows: 1975 -- 46.2 percent, 1980 -- 49.5 and 1982 -- 50.8 percent.

The most important place in plans and projects for reequipping of enterprises is given to measures on raising the technical standard of production and improving the structure of the metalworking equipment park. Of the total volume of means allotted for reequipping, about 70 percent of all capital investments in

the two years of the five-year plan period was directed to acquiring equipment. This made it possible to supplement the park of modern equipment with NC machine tools and automatic lines.

As shown by experience, an important condition for achieving high final results in increasing capacities is to combine work on reequipment with simultaneous (if necessary) work on the partial expansion of areas or modernization of individual production and auxiliary facilities. A more efficient yield from capital investments in reequipment is achieved when concentrating the greater part of the money at a limited number of enterprises that manufacture the scarcest types of products. The time for taking such measures should not be stretched out over a great number of years.

Work on improving the machine tool park at the ministry is being gradually improved in the age composition of the equipment while simultaneously supplementing it with modern high productivity equipment. By the end of the current five-year plan period, it is planned to increase the share of automated metal-cutting equipment to 31 percent (as against 23 percent in 1980). Moreover, the share of forge-press and casting equipment will increase to 16.9 percent (as against 13.7 in 1980). The introduction in production of the planned quantity of progressive types of equipment will make it possible to free up to 20,000 workers conditionally. The following were placed in operation at enterprises of the sector: 14 comprehensively automated sections of machine tools controlled by one computer, over 100 automated and semiautomated lines and comprehensively mechanized sections.

The improvement in the age composition of the park is facilitated by work done on removing unused and outdated equipment a part of which is transferred to nonmachinebuilding sectors of the national economy. Centralized repairs of metalworking equipment, including also repairs for other sectors of the national economy, will develop further. Especially effective is the modernization of universal and NC machine tools by equipping them with modern automatic control systems.

The efficient utilization of the already created production potential is an important factor in intensifying production. In this respect, the sector as a whole, each association and enterprise have considerable reserves, especially the fuller loading of equipment and higher shift coefficient of its operation. In recent years, the shift coefficient hardly increased. The solution of this problem demands comprehensive parallel work on many organizational-technical and social questions.

The labor collective of this ministry's enterprises adopted a socialist obligation for 1984 to increase the shift coefficient of basic equipment to 1.5. For this purpose, the following are planned among specific measures: certify work positions according to the scientific organization of labor requirement; on that basis, reduce outdated and worn equipment; introduce NC machine tools and other modern equipment; wide development of brigade forms of organizations and wages; expand multimachine tool servicing. Of course, the most complex problem for each enterprise is increasing the number of machine tool operators. With the existing situation in labor resources, this can be achieved by internal reserves (freeing some workers from auxiliary production and the more

active introduction of mechanization and automation of production processes and developing multimachine tool servicing).

More active replacement of universal equipment by automated equipment will be necessary. Qualitative improvement of the machine tool park, freeing it from surplus and outdated and worn-out machine tools and machines creates a material basis for increasing the output of each equipment unit. A regrouping of workers is being implemented at a number of enterprises to provide two and three-shift operations of basic equipment which is the determining production potential of an enterprise.

In the remaining two years of the five-year plan period, it is planned in the sector as a whole to implement measures to raise the technical standard which should free conditionally about 26,000 people, expand multimachine tool servicing and increase its share to 23.3 percent by the end of the five-year plan period.

Rebuilding machinebuilding production in the direction of more intensive specialization, the creation of new enterprises and the expansion of existing specialized ones, and large shops that manufacture intermediate products, parts, units and equipment for general machinebuilding purposes, is an urgent problem whose solution is specified by the decrees of the 26th party congress. The development of centralized production of standardized parts, units and products for interindustrial use affects the growth of productivity of labor and an increase in the efficiency of production.

A significant place in the measures being implemented by the ministry is given to specialized centralized production of standardized products and various intermediate products. This is done at specialized plants, in specialized shops for specific specialization (at higher rates at specialized plants of interindustrial production facilities). Centralized production in interindustrial production facilities increased by 64 percent in the 10th Five-Year Plan period. The volume of such products will increase by more than 47 percent. The average annual rates of increase of output in interindustrial production facilities are higher in the sector as a whole.

The share of centralized production for use in general industry in the total volume of its output by enterprises of the ministry reached a high level as follows: of hydraulic drives and hydraulic automatic equipment -- 92 percent; pneumatic drives and pneumatic automatic equipment -- 98 percent; lubrication equipment, filters and normalized reducers -- 100 percent; castings -- 46 percent. Such production facilities, being large-series or mass facilities in nature, provide higher productivity of labor and reduce labor-intensiveness of the manufactured products. Thus, due to the higher productivity of labor at centralized production facilities, about 10,000 persons are conditionally freed annually in the sector.

Because of the development of centralized production facilities, the ministry was freed almost fully from manufacturing hydraulic and pneumatic drives, lubrication equipment, filters, fastenings, etc. This made it possible to move part of the workers, previously occupied in the enterprises for manufacturing them, to basic production shops and reduce general labor expenditures.

The requirements of enterprises in the sector of intermediate products (castings, forgings and stampings, and welded structures) are being satisfied much better both in tonnage and in the list of products as a result of their being made and supplied by large specialized plants. This made it possible for some enterprises to eliminate small unprofitable preparatory product shops and sections. The specialized plants achieved a higher productivity of labor as compared to preparatory product shops (frequently with non-optimal production volume) in the remaining enterprise of the sector. Thus, in 1983, the output per man in centralized plants and in shops of enterprises respectively were as follows: cast iron 52 tons/year and 36.6 tons/year; hot stampings 57.3 tons/year and 52.1 tons/year; welding structures 42.7 tons/year and 31 tons/year.

The process of concentrating the production of castings is characterized by the following data (in percent):

	1975	1980	1983
Increase of output of cast iron as compared to 1972	100	131.4	142.1
Share of output of centralized foundries in the total pro- duction of iron castings in the ministry	34.9	41.8	44.6

During the past three years of the five-year plan period, volumes of production of intermediate products at specialized enterprises increased considerably as follows: at centralized foundries -- by 10.7 percent; at centralized forging facilities -- by 48 percent; at centralized welding plants -- doubled.

In parallel with the development of centralized interindustrial production facilities, work is being done on expanding the centralized production of an entire series of standardized products in specialized shops at individual plants.

In machine tool building, aggregated machine tools and individual units of automatic lines are being built using widely standardized units and parts. For example, in automatic lines and aggregated machine tools developed by the Moscow Specialized Design Bureau, the average degree of standardization is as follows: for aggregated machine tools -- 80 percent; for automatic lines -- 70 percent; for special machine tools -- up to 70 percent. This makes it possible to concentrate the production of these units and parts in specialized shops of individual enterprises. For example, in a number of enterprises in this sector, they have centralized production of spindle boxes, power heads, transport devices for aggregated machine tools; ball and socket joints, small tanks and other units and NC equipment.

In the development plans of capital construction and production capacity, high priority is assigned to industrial facilities that manufacture products for general machinebuilding use. Thus, plans for the 12th Five-Year Plan period specify accelerated rates for increasing the volumes of capital investments in interindustrial production facilities. This will make it possible to solve problems in production intensification.

Changing over the economics of the sector to the way of intensive development depends greatly on solving problems related to the organization of labor in production, to strengthening labor discipline and the efficient utilization of labor resources. A labor control system includes the following: scientific organization of labor; technical standardization; brigade forms of labor organization and multimachine tool servicing; training and increasing the skill of the workers; socialist competition of labor collectives; and material and moral incentives for labor productivity.

Practice shows that the introduction of scientific principles of labor organization even partially produces a considerably result which is expressed in increased productivity of labor. It is achieved, for example, by using such elements of scientific organization of labor as centralized servicing of work positions with tools and intermediate products; and providing time-saving office facilities and equipment. It is planned to increase the productivity of labor in the sector by over 8 percent due to the scientific organization of labor.

Each year of the five-year plan period, a special plan of measures on the scientific organization of labor is approved and sent to enterprises in the ministry. It includes tasks on introducing the following: typical projects on the organization of work positions for mass trades; interindustrial and industrial norms for labor; multimachine servicing and organization of brigade forms of labor. A great amount of attention is given to measures on correlating and disseminating advanced experience and work methods.

Technical standardization in increasing the productivity of labor and reducing labor-intensiveness in manufacturing products plays a great role. Regrettably, unjustifiably little attention has been given recently to these questions in the enterprises of the sector. In many of them, when introducing new equipment and taking various organizational measures to improve technology, existing performance standards are not being reviewed at the proper time; therefore, the proper effect is not obtained.

Starting with the current five-year plan period, centralized planning of tasks on reducing the labor-intensiveness of the products being manufactured was restored. During this period, it is planned to reduce labor-intensiveness in the sector by not less than 27 percent.

A number of organizational measures have been carried out in the ministry which made it possible to raise technical standards. For example, the transfer of functions on establishing the norm for labor in basic production shops to technological services facilitated the establishment of organizational ties between these norms and the development of technological processes and their equipment. As a result, the share of technically substantiated norms increased and reached 86 percent in 1983. Some 13 to 15 percent of all norms are reviewed every year in order to introduce more progressive processes and raise the equipment coefficient. Expansion of the scale of using technically substantiated norms is achieved to a certain degree due to applying a 20 percent addition to the rates of piecework workers. An increase in the output norm on the brigade's initiative merits a bonus calculated on the basis of 50 percent in wages

saved for a sixmonth period. To strengthen the role of technologists in improving technical norms special material incentives have been established for them.

The experience of many enterprises indicates that by raising the standard of technical norms, and timely reviews of outdated norms, it is possible to obtain not less than a fifth of the total increase in productivity of labor.

The brigade form of labor organization plays an exceptionally high role in raising the input of each worker, in solving problems faced by the collective, strengthening discipline and order, reducing losses and unproductive expenditures of working time, and in developing labor and social-political activity of members of the collectives. Regrettably, the possibilities of increasing the volume of production by increasing the productivity of labor in brigades are not utilized fully. Up to 60 percent of all workers and 70 percent of the pieceworkers were included in brigades at the start of this year in the sector as a whole. By the end of 1985, it is planned to increase the brigade form of organization of labor to about 72-73 percent. It remains to develop labor wages in brigades according to a single order taking into account the labor participation coefficient. Practice shows that brigades that organize their work on modern principles (single order with wages according to the final product, using the labor participation coefficient), have higher productivity of labor, as compared to the prebrigade labor organization that increases a minimum of 10-15 percent (there are many brigades where it increased 20 percent and more).

Although there is a decrease in the number of enterprises that did not meet the goal on increasing labor productivity in the sector, there are considerable reserves for raising the efficient utilization of labor resources. Production planning, organization of servicing work positions, technological and production discipline are not as high as they should be everywhere. Reserves for intensifying production also lie in eliminating these shortcomings.

Raising the efficiency of social production is inseparably tied to such most important directions of scientific-technological progress as comprehensive mechanization and automation of production, equipment renovation in the national economy sectors, and in saturating the machine tool park with the latest automated equipment.

Comrade K. U. Chernenko, speaking to the electors of the Kuybyshev election district of Moscow, stated "We must absolutely renovate rapidly and constantly all sectors of the national economy on the basis of the modern achievements of science and technology. This is one of our radical problems. Without this, the progress of society is unthinkable."*

The role of the machinebuilding complex in the solution of this problem is great since it is the leading link in modern economics. It is necessary to expand further the production and scientific-technological potential of machinebuilding, the renovation of the machine tool park and its saturation with high productivity equipment that embodies the achievements of scientific-technological progress.

* K. U. Chernenko. The People and the Party are One. Moscow, Politizdat, 1984 p 10.

Industrial scientific research institutes, design and technological organizations and enterprises of the ministry are working on developing equipment to renovate production organizations of machinebuilding including machine tool building. Machine tool building, taking into account modern requirements of machinebuilding production constantly raises the automation level of equipment; provides a considerable increase in the productivity of labor; intensifies labor processes; concentrates the execution of various technological processes in one machine; and reduces service personnel.

Since the start of the five-year plan period, large scale rebuilding is being implemented of the majority of enterprises in the sector to produce primarily automated equipment -- NC machine tools and machines, automatic lines, robots and robotized complexes, flexible production modules and systems. The output of manual control equipment is being reduced gradually. As compared to 1980, the output of NC machine tools increased 1.8-fold this year for a total reduction in the number of metal-cutting machine tools being manufactured; machine tools of the "processing center" type increased 2.5-fold; and automatic lines increased 1.5-fold. There is also a similar trend in increasing the output of automated equipment for other machines.

The "Metalworking-84" International Exhibition was held in March-April 1984 in Moscow in which over 500 firms from 22 countries participated. The exhibition demonstrated scientific-technological achievements and possibilities of world and Soviet machine tool building in solving problems of intensifying machinebuilding production and its automation. The development level of Soviet machine tool building reflects fully modern trends in world machine tool building, and the sector holds rightfully one of the leading places in the world in the production metalworking equipment and tools.

Modern achievements in the area of automatic control systems, microprocessor equipment, electric drives and automatic electrical systems opened up wide possibilities for automation not only in large series and mass production, but also in series and small series production which make up about three-fourths of the volume of machinebuilding. It also became possible to produce rapidly changeable automatic equipment that operates in the full automatic mode.

A characteristic feature of Soviet machine tool building in the last decade, as in machine tool building of other industrially developed countries in the world, is the changeover to the wide production of NC metalworking equipment. The output of NC machine tools in 1983 as compared to 1975 doubled and as compared to 1970 increased 8-fold. The introduction of NC metal-cutting tools in machinebuilding enterprises produces conditions for automating metalworking processes and for a considerable increase in the productivity of labor (when operating an NC machine tool the productivity of labor increases 2 to 4-fold as compared to operating the usual universal machine tool).

An important stage in the development in NC machine tools is that they permit concentration of all necessary machining operations on one machine tool. Such machine tools are called multioperational or "processing centers." The sector's enterprises make dozens of new models of such centers. For example, the Lenin-grad Machine Tool Building Association imeni Ya. M. Sverdlov mastered the

production of a multipurpose NC drilling-milling-boring machine tool for machining housing parts weighing up to 4000 kg. This machine tool can drill, mill, countersink, bore and broach holes connected by precise distances between them. The NC system automatically moves the mobile units to given coordinates, changes tools automatically and moves the table-satellites.

Flexible production systems for various purposes and of various degrees of automation are created from the production modules. These flexible production systems require minimal participation by man in the production process. An example of such a system is the "Talka-500" system created by the Ivanovsk Machine Tool Building Association imeni 50-letiya SSSR. It is designed to manufacture 500mm housing parts by unmanned technology in small-series multi-product production. The computer in this system has the functions of planning, dispatching, accounting and controlling, providing thereby a continuous production rhythm. The technological preparation for production includes automated development of control programs without debugging them on the machine tool. The program may be stored in the computer memory for a long time and, at the needed moment, it automatically enters the NC system of the machine tool module. On instruction of the computer satellite tables, intermediate products and tool cassettes stored in the warehouse are delivered to the machine tool. The following movements of the intermediate product and tool are provided by the NC system. This flexible production system increases productivity 2.2-fold, makes it possible to reduce equipment used to a half and reduces the number of workers. Such systems have a great future.

The Designs of forge-press and casting equipment are developing in the direction of their automation and creation of machines for precise and low-waste technological processes in order to obtain the most efficient intermediate products. Last year, the Azov Special Design Bureau for Forge-Press Equipment and Automatic lines, in cooperation with the Sal'sk Forge-Press Equipment Plant, created an automated complex which includes a 63 ton-force press and magazines for storing 16 different dies and intermediate product strips. Program control provides automatic feed to the intermediate products and a change of dies. The complex makes it possible to replace nine universal presses and reduce the technological preparation time.

New types of robotized complexes, sections and automatic lines for foundries are being developed.

The development and production of automated equipment for the renovation of the machinebuilding park, including machine tool building itself, are basic problems of sector scientific research institutes, design and technological organizations and enterprises of the ministry.

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INDUSTRY PLANNING AND ECONOMICS

CEMA COMMISSION ON COOPERATION IN MACHINE TOOL DEVELOPMENT

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN CHLENOV SEV in Russian No 5,
May 84 p 47

[Article; "91-st Meeting of the CEMA Commission on Cooperation in Machinebuilding"]

[Text] The 91-st meeting of the Permanent CEMA Commission on Cooperation in Machinebuilding was held in March 1984 in Moscow.

At the opening session, V. V. Sychev, CEMA secretary, stressed the importance and the positive work of CEMA Commission on cooperation in machinebuilding in the implementation of urgent cooperation problems. The secretary noted that the CEMA Session and the executive committee posed before the commission important problems on expanding the cooperation in creating and organizing the production of promising types of equipment and the means for automation that would determine the technical progress, such as industrial robots, NC machine tools, flexible production systems, etc., and wished successful and fruitful work to the participants of this session.

The commission listened to and discussed the report by T. Kurt, First Deputy Minister of Metallurgy and Heavy Machine Building of the ChSSR, who presides at the 91st Session. He spoke on the problems faced by the commission with regard to the CEMA decrees (37th Session) and the Executive Committee decrees (108th and 109th sessions). The commission adopted resolutions, approved by the 37th Session of the CEMA, to implement basic directions for expanding and improving cooperation between CEMA member countries on economic and efficient utilization of the power-fuel and raw material resources, including secondary ones, and comprehensive measures for improving the supply for consumers in CEMA member countries.

The commission approved proposals to specialize production, in 1986-1990, of diesel engines, units and parts for trucks, as well as proposals to supplement agreements on scientific technological cooperation to develop and improve hydraulic and pneumatic equipment for automation, including NC machines and industrial robots, which are envisioned as priority cooperation problems.

The implementation of the general agreement on multifaceted cooperation in developing and organizing specialized production of industrial robots was reviewed. The commission developed proposals for additional measures directed toward the implementation of the general agreement program concerning industrial robots on a modular basis and improving coordination in this area.

The state of work on developing NC machine tools was analyzed on the basis of the plan approved by the executive committee for 1981-1985 involving the development of modern NC metal-cutting machine tools and NC devices. Corresponding measures were adopted.

Projects were approved and recommended for signature on specialization and cooperation for technological equipment for the production of the following: shipbuilding; prefabricated components for large-panel housing; lumber-cutting machines and equipment; aggregated machinery and units for petroleum and gas producing equipment; axles for construction and road machinery; equipment, products and materials for shipbuilding.

Projects were approved and recommended for signature of agreements on scientific-technological cooperation to develop machines and equipment for chemical purification, as well as in the area of improving technological processes in chemical machinebuilding.

Reports were approved of work done by the commission in 1983 and its further activity, as well as on the progress and results of work done on scientific-technological cooperation, the efficiency of this work, and the introduction into production of newly developed machines, equipment and devices that meet modern standards.

Materials of the working bodies of the commission were reviewed on creating and organizing specialized production of machines, equipment and devices that are not manufactured in CEMA member countries, or are manufactured in limited quantities.

The commission also reviewed the reports of a number of its permanent working bodies for the last two-three years in the directions of further increasing the efficiency of their work.

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INDUSTRY PLANNING AND ECONOMICS

MERITS OF MOSCOW VERSION OF ECONOMIC EXPERIMENT VIEWED

Moscow IZVESTIYA in Russian 19 Jun 84 p 2

[Discussion recorded and conducted by IZVESTIYA economic observer V. Romanyuk: "The Moscow Variant"]

[Text] The wide-scale economic experiment which was started January 1, 1984 in a number of national and republican enterprises became an important sign of our economic life. More than 700 collectives are verifying new management methods, and new elements of control. Among them are 29 industrial enterprises and organizations of the capital. The peculiarity of the Moscow experiment is that enterprises of the Ministry of Light Industry, the Ministry of Instrument Making, and the Ministry of Construction, Road and Municipal Machine Building are taking part together with plants and corporations of the Ministry of the Electrical Equipment Industry and the Ministry of Heavy and Transport Machine Building. This certainly extends the framework of the experiment and makes it possible to objectively judge how effectively and with which measures its levers and mechanism act.

The industry of the capital accumulated no small experience in conducting various experiments which enriched our economic practices. Moscow has a large number of qualified specialists in economic management, as well as a technical intelligentsia. Therefore, one can expect here, as a scientist would say, special purity.

The following officials took part in the discussion:

Ye. V. Ovsyannikov, head of the Department of Machine Building in the Moscow City Party Committee of the CPSU; B. N. Stepanov, first deputy chairman of the Moscow Gorispolkom and chairman of the Municipal Planning Committee; V. V. Il'in, head of a subdivision of Gosplan USSR; V. V. Veretennikov, secretary of the party committee of the Manometr Plant; S. V. Demidovich, general director of the Dinamo Electrical Machine Building

Association; I. M. Kalinin, general director of the Moscow Machine Building Plant imeni M. I. Kalinin Association; V. A. Solyanik, general director of the Moskabel' Production Association; Yu. N. Shirshov, deputy general director of the Transmash Production Association; K. I. Sakharov, metal worker of the Metal Plant imeni Vladimir Il'ich; A. P. Litvinov, brigade leader of metal worker-assemblers of the Elektrozavod imeni V. V. Kuybyshev Production Association; G. L. Deshalyt, deputy general Director of the Manometr Production Association; A. M. Borisov, head of the experimental shop of the plant producing vacuum furnaces; and others.

The First Layer: Have All Reserves Been Put Into Operation?

The discussion began with the events of recent past--the time when the experiment started in Moscow. The participants of the discussion recalled: at the end of last year workers directly asked what was going to be changed in their shops on January 2? A lot has been changed, and this is how Ye. Ovsyannikov, head of the Department of Machine Building of the Moscow CPSU Gorkom, initiated the discussion at the "round table."

Ye. Ovsyannikov: The changes were being prepared long before the beginning of the experiment. The gorkom came to the decision to organize in Moscow a special commission which included deputy ministers and leaders of the municipal planning commission, the territorial administration for material-technical supply, financial organizations, main administrations of the Moscow gorispolkom and others. Thanks to the assistance of this commission all the enterprises and associations began the experiment with planned assignments which were worked out with regard to new economic indicators and quotas. The material security and organizational service were better balanced. Party and soviet organs did a lot of work in order to prepare cadres, and to increase responsibility of the leaders for the results of the experiment.

The majority of the enterprises coped successfully with the plan under the new circumstances. The collectives of cotton textile plant imeni M. V. Frunze and the associations Transmash and Manometr achieved 100 percent of deliveries.

V. Veretennikov: I think that this is a result of the active participation in the experiment of a large number of the workers--if not of everyone--in the plant. The party committee decided from the very beginning to make the experiment a matter of the entire collective. We prepared a special leaflet for the workers, in which in a simple form, we described the conditions of the experiment. We also specified what depended on this or that shop, sector or brigade and what material and other benefits one would get in the case of successful work. A similar leaflet is being prepared for the engineering-technical workers and employees.

One could tell much more about it, but most important is that we achieved complete fulfillment of deliveries while decreasing the number of workers. What is interesting is that the workers found labor reserves themselves. The question is how to use the freed-up people, because most of them should be retrained. Recently we put into operation a new micro-electronics shop which was completely manned with the workers from other sectors and who received new professions.

B. Stepanov: I am the chairman of the municipal planning commission, and as such I was especially glad to notice the tendency toward the reduction in the number of workers, which became obvious during the experiment. Labor is a constant shortage in Moscow, but here it began to disappear without any special efforts, in passing, so to speak, in the process of improving the organization of production. It is delightful that the experiment brought into action a self-regulating system of control, of a certain kind, which works in a direction necessary for us.

The following are some results of the first stage of the economic experiment conducted in 29 enterprises:

1. The productivity of labor during five months increased by five percent as compared to the same period last year. This is higher than the average rates of growth of the capital's industry.
2. More than 50 new products and more than 43 new technological processes were mastered. Ten automated lines and 48 highly productive machine tools and machines were put into operation.
3. More than 700 tons of rolled metal, around 100 tons of conventional fuel, and 3.5 million kilowatt hours of electric power have been saved. This surpassed not only plan requirements, but socialist obligations as well.

General Opinion: The beginning of the experiment in Moscow is very promising. At the same time it is obvious that only the top layer was taken off--only the reserves which lay on the surface were put into operation. A lot has yet to be done. In particular, the planning work should be improved, the industrial capacities should be used better, and the technological discipline should be strengthened. Other problems connected with the development of the experiment also became obvious during the discussion at the "round table."

Plan and Resources: Why They Are Not Always Balanced?

It appears that the most important problem at the first stage is the equilibrium of the plans. For example, the so-called advance issuing of funds which does not guarantee the delivery of those materials and sets of products necessary to the enterprise for rhythmic production, still partially exists in supplying.

V. Il'in. As a worker of the USSR Gosplan I would like to indicate that no one ministry or enterprise participating in the experiment ever addressed Gosplan USSR or other departments with a request to adjust the production

program or salaries. To tell the truth we received signals about instability, in a number of cases, of confirmed plans. First of all, ministries themselves should work out the production program more clearly. The rights which are given in this matter are great. The economic experiment provided the participants with a very important advantage--they received a significantly longer, compared to others, planning period in order to work out the plan, to connect it with the material-technical resources, and to conclude economic contracts.

Question: Then why does the practice of issuing of funds still exist?

V. Il'in: Indeed, the practice of advance issuing of funds has not been abolished completely yet, although we had such a task during the experiment. The problem is that the participants of the experiment are connected through contract relations with branches which do not participate in the experiment. The Ministry of Ferrous Metallurgy, the Ministry of the Chemical Industry, and the Ministry of Railways have improved their service of the experiment and now the question is that these branches should also change over to working under the new conditions. I would like to emphasize here that I am speaking not about any privileges with regard to material-technical supplying, but rather about restoring the order, and adjusting contract relations with the suppliers.

V. Solyanik: From my position as the general director of Moskabel' I would not evaluate the situation so optimistically. It is too early to talk about complete equilibrium of the plan. Moreover, the violations of the plan began even at the preparation stage. As before, they attached with 'unreal' suppliers of sets of products and equipment.

I. Kalinin: I can only support my colleague. The plan in our machine plant is not only unbalanced, but also unstable. During the last four months, we have been receiving additional assignments.

Comment from the Audience: We are working now according to new methods, but the practice of planning "what has been already achieved" is still in effect. That is why the enterprise has to hold on to the reserves.

S. Demidovich: The discrepancy between the plan and the material resources at the beginning of the experiment at the Dinamo plant amounted to almost 30 percent. Then in the first quarter we had six changes in the program. Now we should probably discuss the survival of old methods of controlling the economy and even of the tendency of certain workers to adapt new conditions of the experiment to already existing practices.

We, for example, worked out a thesis about material stimulation of the shops, sectors and brigades in which everything was boiled down to three basic indicators: the fulfillment of the delivery plan, technical reequipment and the growth of labor productivity. Heads of shops and foremen acquired a feeling of their rights and became confident that if they worked conscientiously, the amount of remuneration would increase.

However, it became clear that the rights which were given to us are not guaranteed at all. Some provisions of the experiment were essentially changed by the Ministry of Finance, and in some cases they were simply abolished. For example, in the provisions of the experiment it was written that if the deliveries are fulfilled 100 percent according to the contracts, the economic stimulation funds will increase by 15 percent. Later there appeared an instruction in which it was specified that this 15 percent can be used only if one achieved above plan profit. What if one cannot get this profit? We were assigned a very intense plan, including that for profits and nobody was talking about the above plan profit.

V. Solyanik: Yet the rights particularly with regard to material stimulation have been essentially increased. Previously we were glad to pay the workers more for a useful contribution into production, but we could not do it because of wage limitations of different sorts. Now we have the possibility to independently solve the problem of combining trades. We have temporary wages for the workers who are engaged in mastering new production, adjusting and starting new equipment.

V. Il'in: If a ministry deprives a plant of the right to allocate certain sums into the fund of material stimulation, provided 100 percent delivery plan was fulfilled, it commits a serious violation. Why did you not address this question to the Ministry of Finance or to the Ministry of the Electrical Equipment Industry? Nothing ventured, nothing gained. One should fight for his rights. As a last resort you can appeal to the Commission for the supervision of the economic experiment of Gosplan USSR.

G. Deshalyt. To whom should we address this problem: under the new conditions the indicators of our activity did not in fact diminish, as was thought, but rather increased--the new indicators were added to the old ones. Although some of them are confirmed, others are calculated. For example, the indicator of the realization according to the conditions of the experiment can be used only to record contract requirements. However, in order to evaluate our work from a regional point of view, the realization as well as the volume of commodity output remain most important. We did not plan for the number of workers. However, in Moscow on the whole this number was planned. What could we do? We also did some planning. The paradox is also that while not planning the number of the workers on the whole, they continued to give us tasks to diminish the number of administrative-managerial personnel (AUP). Let us assume that we have to strengthen the parts and equipment service, to send 20 specialists there. We do not have such a right because this category of workers is included in the AUP.

V. Il'in: Why did some provision of the economic experiment, especially in the field of planning of capital investments, not work out? For example, the Ministry of the Electrical Equipment Industry worked out a clear methodological instruction in this regard, but could not realize it. Gosplan USSR should be blamed for this. The matter is that when the plan for capital investments for the ministry was being worked out, the contract for the construction work had been already scheduled.

S. Demidovich: The experiment gave one the right to use funds for the development of production. However, at the same time, the quota was set so low that this right was practically useless. Before the experiment, under normal work our fund for the development of production reached two million rubles, but now we have only 1.2 million rubles. If the present situation is preserved our equipment will become old.

General Opinion: It is too early to talk about a clear-cut connection between production plans and resources. The participants of the discussion at the "round table" expressed a unanimous desire that the planned targets be determined at earlier dates, and that ministries, USSR Gosplan and USSR Gosstrib would observe these dates. Now, on the contrary, these dates in a number of branches were transferred to August 15, and later may be to October-November. Certain central organizations also introduced some "corrections" in order to make their life easier. For example, the dates to present the planned documents for delivery of production by the Main Administration of Supply and Sales disappeared totally from the new methodology.

Cost Accounting is Not Merely Calculation: One Should Improve Stimulation as Well.

In the end, the conditions of the experiment are but a further development of the principles of cost accounting at an enterprise level. However, this kind of development should be also seen at a lower level--first of all in brigade cost accounting. A. Litvinov, the brigade leader of the metal worker-assemblers at the electric plant imeni V. V. Kuybyshev, told the participants at the "round table" about the brigade cost accounting under the conditions of the experiment.

A. Litvinov. Previously our brigades in the plant did not have many people. Now they began to strengthen the brigades and to create flow-line integrated brigades which work on a single order. The payment is made according to the final result of the work, taking into consideration the coefficient of labor participation. If someone has to lose his bonus the brigade makes the decision, not the head of the shop. When our brigade was organized in 1979 it included only six people. Now there are 23 people with which we cover the entire cycle of production. Individual norms which were scattered along the chain before have been put in one unified norm. The members of the brigade are paid now only after they turn in products to the warehouse.

Our brigade is ready to switch over to cost accounting. However, the proper conditions for this have yet to be created. Let us take the saving of materials. We still have very expensive solders. We save them, but we cannot calculate everything the brigade is saving. In our shop we have managed to save fuel-energy resources, steam, and air. The question is how to calculate this kind of economy in a sector or a brigade? To achieve this one must reconstruct the sector so that there would be certain control devices which would record this kind of economy. We discussed this problem in the brigade council but have not solved it yet.

Question: What has the brigade gained directly for its participation in the experiment?

A. Litvinov: The salary of every member of the brigade has increased by 12 percent. Besides, some of the temporary workers in the shop had their wages increased and the best adjusters had additions to their rates.

V. Veretennikov: I would say that cost accounting is generously stimulated under the new working conditions. As a result, we had real changes in people's attitudes at our Manometr plant. Even the tool makers, our working intelligentsia, are unanimously voting for the brigade organization of labor. At the same time there were some difficulties connected with the accounting of final results in the automation and lathe-turning shops. The psychological barrier has not been overcome everywhere. Many of the qualified workers still prefer the piece-rate system.

Yu. Shirshov: In our Transmash plant just a little bit more than half of the workers entered brigades. However, the problem is not in the scope. What we are talking about today is the in-depth development of the brigade cost accounting. Foremen and engineering-technical workers are asking us, the leaders of enterprises, now to include them in brigades. At the same time, workers themselves feel the need for engineering expertise. Very often they cannot cope with all this bookkeeping. However, there is a problem. Recently the State Committee for Labor and Social Problems has issued a model statute, according to which a foreman can serve without violating the norm. This number is around 30 people. What should we do if there are 25 workers?

K. Sakharov. There are problems which we, the workers, can see even without prompting from specialists. For example, a machine tool at the price of 90,000 rubles was sent to our plant imeni Vladimir Il'ich. An attachment to it cost also 90,000 rubles. And now this equipment is sitting there without any use. We said that we did not need this program-controlled machine tool. It should be used not in the tool shop, but rather in the large series production. But they answered--take it, it is new equipment. As a result, a lot of non-working and often non-installed equipment has accumulated at the plant.

A. Borisov: I would like to talk about the normative base of the experiment and its influence on the development of the brigade profit and lost management. It is known that the experiment makes it possible to determine additions to the salaries of the highly qualified workers. However, these additions are allocated from shop salary funds. Thus, the collective of a shop itself will suffer, if there is excessive "generosity." Why is it so? It is because the correlation between the rate of growth of the productivity of labor and the salary can be undesirably broken. The situation in our plant for vacuum furnaces is such that the head of the shop has to hold back the yield of the brigades.

Comment From the Audience: A great number of the stimuli stipulated by the experiment work very poorly and do not correspond to the efforts made.

After we lowered the prime cost of the production by 0.8 percent we received for the entire collective only 16,000 rubles in bonuses. However, the saving of resources was quite considerable.

Ye. Ovsyannikov: The question is posed correctly. A differentiated approach, depending on the technical level, the specification of production, and the degree of the equipment wear, should be ensured while determining standards.

V. Il'in. No doubt we have problems in this. The USSR Gosplan believes that a great number of large enterprises, such as the Moscow Association Dinamo, have the right to propose their own system of cost accounting in order to test it in the people's economy. The Volga Automobile Plant has already proposed the enlargement of the system under which it is working now. This collective worked out a target—to achieve an integrated use of the methods of cost accounting. Here, only the use of separate elements of cost accounting was discussed. Certainly, the results with this kind of attitude will not be great.

General Opinion: The urgent requirement of the experiment is to deepen and to develop cost accounting. A differentiated approach should be provided towards enterprises working under different conditions. The problem of improving the structure of the cost accounting collectives became urgent as well. The place of the foreman and the head of the sector in the brigade cost accounting has not been determined yet. The methods of control and evaluation of the activity of working collectives have not been worked out. The participants of the discussion at the "round table" rightfully brought this to the attention of the State Committee for Labor and Social Problems.

Suppliers, Customers: Where Has The Chain Been Broken?

The problem that it is not that easy to ship in time the products which were manufactured on time was discussed at the "round table."

V. SOLYANIK: I would like to mention the problem of the rate of non-transit shipments. This problem is being solved very poorly. It was suggested that I ship products according to non-transit rates to the territorial bases. However, one cannot load micron-size wire and 10 kilovolt power cable into the same car. We need small-sized containers, but there are none. I have an impression that in terms of material-technical supply we switched to the experiment, but the market is still somewhere behind.

It is about time to solve the problem of enlarged production orders. Here is a real situation. Soyuzglavkabel' allocated to Ukrglavkabel' 130 tons of enameled wire. Then, these 130 tons are divided among seven territorial bases, then among numerous consumers—three, two tons and even 500 kilograms each. Then we receive an avalanche of orders and have to make hundreds of contracts for delivery. If we could ship these products to the seven bases and then to deal only with them, that would be a different story.

Yu. Shirshov: I totally support the way V. Solyanik poses the problem. We should abandon the shipment of small portions of production. USSR Gosplan, in

my opinion, is not working on this problem. While the material-technical supply improved, there are obvious signs of rigidity in sale.

V. Il'in: I agree that the system of marketing products needs to be improved. The problem of non-transit rates of the shipment of products was discussed in the commission of the USSR Gosplan which governs general management of the economic experiment. In its special resolution USSR Gosplan gave enterprises the right to dispatch products to territorial bases, without waiting until they have enough products to meet the transit rate requirements.

Question: Have any measures to switch the transport to small-sized containers been made? The enterprise which has thousands of customers has to operate as a wholesale store.

V. Il'in: USSR Gosplan is now working out rates of shipment, they are being reviewed but they will be legislated only in 1985.

Comment From the Audience: We still have to decide what is more profitable—to organize our own large bases, or to increase shipments in small-sized containers.

Ye. Ovsyannikov: The city commission for cooperation with the economic experiment also raised this question in the territorial administration of Gosplan. The situation is as follows: if on territorial bases we will wait for a month or two months until we have enough production to meet transit rates requirements, our customers will be in a difficult situation. The supplier who in his turn is a customer of the production of many other related branches will lose too. The problem is really complicated, but we have to look for the ways to solve it.

General Opinion. The problem with sale did not occur accidentally. The enterprises depend more on the final results of their activity under the conditions of the experiment, and sale is the final operation of manufacturing goods. The organs of Gosplan should pay close attention to this discussion and solve the problem with sale.

Thus, let us conclude our discussion at the "round table." It is really delightful that even in this short period of the experiment a noticeable step was taken to improve economic management, and to bring the economic mechanism up to date. However the experiment is an experiment; during it we found serious problems which need a principled solution.

First of all what causes our anxiety is the absence of equilibrium in a number of instances between production plans and material-technical supply. This problem should be thoroughly considered before the plans for 1985 are worked out. What we are talking about is not advantages, but rather simple order in planning. In this Gosplan USSR and the ministries must provide maximum clarity for the experiment. So far the experiment gave preference to the technological chain of production. As far as technical progress goes, we have not been successful, through new levers and stimuli in achieving

considerable acceleration of scientific-technical progress and renovation of manufactured products. It could be explained, as it was noted at the "round table" and by IZVESTIYA, by a non-comprehensive introduction of the provisions of the experiment. The Ministry of Heavy and Transport Machine Building and the Ministry of the Electrical Equipment Industry, which are the headquarters of the pioneers branches, should take the responsibility for it.

Because one of the main conditions of the experiment was to meet the delivery plan, the contract relations between customers and suppliers will need further improvement. The organs of Gosplan and Gossnab USSR, and the Ministry of Railways should take part in the experiment more actively, especially with regards to shipment of products. Branch ministries should satisfy actual needs of the people's economy more effectively.

It is about time to talk about widening the framework of the experiment, preparing conditions for changeover to new principles of work in the branches which produce initial products. This will include ferrous and nonferrous metallurgy, chemical industry, and wood processing industry. The efficiency of the entire people's economy depend on them. One should not forget that the food industry, light industry, and local industries of a number of republics also take part in the experiment. These branches are widely represented in the capital too. The most important task of the city organizations and central organs is, using experience of the collegiums, to actively involve these branches in the experiment. In this we should hear from the commissions for the management of the experiment of the Moscow CPSU Gorkom and USSR Gosplan.

Leading work experience under the conditions of the experiment and problems found in the course of its introduction should be considered as a base for the further improvement of the new methods for managing production and increasing independence and initiative of associations and enterprises.

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INDUSTRY PLANNING AND ECONOMICS

ECONOMIC EXPERIMENT NO SOLUTION TO SOME CONTRACT OBLIGATIONS

Moscow IZVESTIYA in Russian 23 Jul 84 p 1

[Article by V. Romanyuk, economic reporter of IZVESTIYA: "After the Order..."]

[Text] On 4 June 1984, Mosgorarbitrazh [Moscow City Arbitration] reviewed four cases involving economic disputes. Appearing as the defendant was the "Dinamo" electrical machine building association. Among the "plaintiffs" were several large enterprises of Mintyazhmash [Ministry of Heavy and Transport Machine Building]. Neither L. Galishnikov, deputy general director for economics, nor N. Martynenko, chief of the planning and economic department, expected such an ending. Yes, those ill-fated 500 electric crane motors of series "D," "pounded" into the plant's plan 26 December 1983 by the "Soyuzelektrotransmash" All-Union Production Association [VPO], hung over the collective like a sword of Damocles. Two million rubles of commodity production is no joke. It was ridiculous to speak of retooling production, acquiring sheet metal and equipment, and solving the question of labor resources--all in the last 4 days of the year.

The plant, trusting in the rights granted to it by the economic experiment, sent its categorical objections to the VPO. There was no reaction at all to that course at the time. This inspired certain vague hopes. But suddenly--come "onto the carpet," please. And what was especially galling was the fact that the enterprise's economy had just begun to meet the norm: shipments had been stabilized and the first bonuses had been paid out.... Now the experiment turned to the other side of the coin, to the punitive side.

"How do you explain the fact that for a period of almost 6 months no contracts were entered into with consumers?" the arbiter asked.

"The plan was confirmed to the plant for 3,100 electric motors in series "D." It was coordinated with the Ministry of the Electrical Equipment Industry, the USSR Gosplan and the USSR Gossnab in the established time period."

"Changes were made in the plan that are confirmed by the VPO "Soyuzelektrotransmash." On this basis, the USSR Gossnab issued to you funds notifications for the delivery of the production. You are obligated to execute them immediately."

That was the end of the conversation. The "Dinamo" plant was ordered to pay 1,000 rubles for "failure to conclude contracts and lack of discipline in their execution" and to proceed immediately to enter into contracts.

So as not to pay additional thousands, letters were quickly composed to consumers, with whom the Dinamo people had already exchanged rather sharp letters twice before. They were hurrying to please the machine builders and metallurgists: everything is in order, do not worry, we will enter into contracts for shipments.

"I can only sympathize with Stanislav Vladimirovich Demidovich," summarizes A. Chentsov, chief of the planning department of "Soyuzglavelektro" of the USSR Gosstab, "but we cannot reduce the plan for the production of excavators, which will remain a pile of metal without electric motors. We cannot leave the iron and steel industry without spare parts; that would cause a sheet metal shortage for the electrical engineers themselves."

"We understand that the change in the plan was dictated by the needs of the national economy," says S. Demidovich, general director of the "Dinamo" association, "but we cannot agree with the way this problem was solved. We now face the real danger of losing 3 to 4 percent of deliveries as well as of being deprived of all funds, and we will be forced to pay 5 million rubles in punitive sanctions. And we have no possibility of defending our own rights. On the other hand, we bear full proprietary responsibility for the implementation of contracts: I am paying fines for not delivering enough motors, and I am taking on the "regressive" fines for the failure of my consumers to make deliveries. A large excavator is hundreds of times more expensive than an electric motor, but I am paying for the entire excavator, and that is absolutely devastating."

"Who knows, it may be that we did not know how to make use of our rights," says L. Galishnikov, deputy general director for economics, with a shrug of his shoulders. "But you have to agree that the plan must be balanced. And once an addition is made, it is automatically necessary to change the entire chain of indicators."

G. Mikhaylov, deputy chief of the VPO "Soyuzelektrotransmash," asserts that the plant has been given all necessary help. In the first place, extensive cooperation is foreseen in the production of these same 500 electric motors. Secondly, people are being sent to the plant to help in doing specific work. Thirdly, some of the assigned products are being taken away from "Dinamo."

Well, let us take things in order. The first essential question is why 500 and not 490 or perhaps 510? An analysis of contractual obligations carried out for "Uralmash" alone showed that the actual requirement of this giant of heavy machine building is not 100 electric motors in series "D" as included in the contracts, but only 69. And the requirements of many other consumers also turned out to be more modest. Does that mean that something could have been done during the early stages of the plan? It certainly does.

Further, about cooperation. Indeed, an order signed by G. Voronovskiy, first deputy minister of the electrical engineering industry of the USSR, stipulates that "Elektrot'yazhmash" in Khar'kov will make stators for electric motors, and the Brezhnevskiy Plant for electrical transport equipment will manufacture the corresponding rotors.

In accordance with the schedule, the Dinamo people sent castings to Brezhnev and unfinished work pieces to Khar'kov, and technologists left Moscow to help in

preparing the production. Six months passed, and what happened? Not a single package returned to the plant. The people in Khar'kov, to be sure, began work on the stators, but in Brezhnev they have not yet begun to implement the order. Did this worry anyone at VPO? Not at all. Not until July, when the Dinamo plant started to receive fines, did VPO director V. Kleshchev go to Brezhnev, after which schedules were finally signed for the shipment of rotors to Moscow.

In taking on an additional burden, let us say in involving itself in an important national economic task, the plant had a right to count on a more rapid freeing of capacities from part of its products list, at least through implementation of the order on specialization in the sector. Dozens of enterprises are under the authority of the VPO. Its management has a better picture of how to distribute the load and whom to entrust with what so that the top priorities of the national economy are carried out with full assurance and without strain. So far, however, little has been done in this direction. Endless discussions are continuing on what to transfer and what not to. Either the transferred product assignments seem insufficiently progressive to one of the partners or the essential part effective in lowering labor intensiveness has already been taken.

I had the opportunity to attend the joint meeting of the party committee bureau of the Dinamo plant and the party bureau of the VPO "Soyuzelektrotransmash." It was taking place for the first time and much was expected of this meeting. The plant workers set forth their problems and the VPO specialists expressed a large number of relevant remarks on personnel matters, technical norm setting and finances. But mutual affronts and irritation frequently came to the surface. And in this regard, VPO director V. Kleshchev was forced to note that the speeches of the participants in the meeting manifested the level of interrelations of 10 years ago.

In essence, that is the way it has remained. The economic experiment requires reorganization of the management style, development of initiative and, if necessary, economic risk. But is everyone ready for that? Look through the folders of the VPO regulations that are coming to the plant in abundance. Most of them start with the words "accelerate the shipment...."

"Not one of the directions of the planned reconstruction has been implemented," complains head plant engineer V. Drovetskiy. "We outlined a large program for robotization of production, and over 3 years we want to create 12 flexible production lines, a shop and two sections under computer control. Many questions arise in connection with this in the area of financing, receipt of projects and allocation of equipment, but there is no one at the VPO who would be seriously involved in this."

And now, having put the plant in an extreme situation, the managers of the VPO "Soyuzelektrotransmash" chose the simplest and least responsible means of implementing the ministry's order: they issued their own order. Not finding a solution at the VPO for even one of the fundamental questions--unloading of capacities, technical retooling, financial support and finally, a balancing of the plan with resources--plant workers are going directly to the functional offices of the ministry.

All of these battles around the plan increment are not making the Dinamo people look good either. And, setting emotions aside, one must concede that it is still necessary to make 500 electric motors. Much has been neglected. In the short span of a half year, there cannot fail to be emergencies and increased production expenditures. But it is also obvious that the sector staff sets the style for the working interrelations in the operational hierarchy. It would seem that rights and responsibilities ought to be distributed in a completely balanced manner, and everyone should personally answer at his own level for the quality of decisions. But in this case, it seems as though there are one-way valves mounted between the enterprise and the VPO: the rights go in one direction and the responsibility in the other.

"What does the economic experiment have to do with this?" says deputy VPO director G. Mikhaylov with irritation. "We were ordered to include 500 electric motors in the plant's plan. We put them in. And the plant's managers are now quarreling instead of involving themselves in production."

Now after this, talk about how the economic experiment provides for a longer preplanning period and guarantees a stable plan that is balanced in terms of material and labor resources, opening up room for initiative in work and a profound analysis of production reserves. It does, of course, guarantee these things, but under the condition that the rights granted to the enterprise remain inviolate, that these same rights, after being issued by one hand, are not immediately snatched away by the other. At the VPO, they say that the experiment is all well and good, but the national economic tasks must be solved. But after all, the reason for the introduction of the economic experiment was to perfect new elements of management and to solve the tasks at any level of difficulty more efficiently and with smaller expenditures.

A detail is illustrative. The 1985 plan is already being coordinated. A control figure has been received from the VPO for 3,800 electric crane motors. This is already from the current year's "base" a priori considered to have been achieved. The plant came back with a plan for 3,300, meaning that the plant is still holding on to "its own base."

I caught L. Galishnikov, deputy general director of the association, composing a letter to the USSR Council of Ministers.

"Writing to the ministry," says Leonid Anatol'yevich, "is a hopeless matter. The message will be returned to us through the chain. We want to include the plant's group of deputies and attract the attention of the directing organs to our misfortune."

No, one could not feel any confidence in his voice. And I thought, not without bitterness, about how the energy and experience of the managers of the very well-known capital-city association could be directed to entirely different purposes. If, of course, the question of the establishment of the plan were not reduced to a mechanical operation and there were no undermining of the people's faith in the fairness of decisions made and no undermining of their confidence in any degree of stability and rhythm and in the fact that the efforts made will be properly appreciated both morally and materially.

What is the value of responsibility without the right to make decisions? For it is as if all of those rights that the Dinamo people sought unsuccessfully to avail themselves of during the first stage of the economic experiment were, in essence, rented by them, as it happens in the operational "games" of the administrators. But the "game" with the plan was always an expensive one, and not just for the labor collective but for the state.

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METAL-CUTTING AND METAL-FORMING MACHINE TOOLS

UDC 658.2:621.9.06

NEW MACHINE TOOLS DISPLAYED AT MOSCOW SHOW

Moscow MASHINOSTROITEL' in Russian No 6, Jun 84 pp 44-45

[Article by I. S. Vitol': "Machine Tool Builders Demonstrate"]

[Text] The "Stankostroitel'nyy zavod "Production Association imeni S. Ordzhonikidze, the leading enterprise in the sector, manufactures machine tools and automatic lines which are widely known not only in our country, but also abroad. It was awarded the Red Challenge Banner of the CPSU Central Committee, the USSR Council of Ministers, the VTsSPS and the VLKSM Central Committee and recorded on the All-Union Honor Board of the USSR VDNKh for achieving the highest and most stable indicators in the all-union socialist competition, the successful fulfillment of the state plan for economic and social development of the USSR and higher social obligations. The collective of the association worked well in 1983 as follows: sets of 15 automatic lines (for the "ZIL" Production Association) and of 6 model IL430 high productivity lines for manufacturing "DON-1500" engines for the Khar'kov "Serp i molot" Motor Building Association were provided a month ahead of schedule; a set of 16 readjustable automatic lines was delivered ahead of schedule for machining cylinder blocks for high power engines which freed conditionally 816 workers in the national economy; 9 automatic lines and 193 aggregated machine tools were supplied to agricultural machinebuilding enterprises.

The association displayed its achievements in the "Machinebuilding" pavilion at the USSR VDNKh.

The LAS ChPU [NC] -40 rapidly readjustable automatic line is designed for machining shafts of various configurations (with 40 to 400mm diameters, 500 to 1400mm long) in small series and series production. The lines do rough and finish machining of cylindrical, conical and shaped surfaces, fillets, chamfers, grooves and threading. It provides a second and third class accuracy.

The automatic line is assembled of special model 1B32F3U3 NC turning semiautomatic machines, a model SM160F2 overhead type automatic manipulator, intermediate product and finished product magazines. The line is equipped with transporters for mechanized removal of chips and a protective fence for work safety. The manipulation loads the machine tools automatically in any sequence according to a given program. A magnetic tape is used for long time storage. The central control panel has light indications by which it is possible to judge the machine tool operation without entering the zone of the manipulator.

The use of automatic lines makes it possible to reduce the service personnel, provide multimachine tool servicing and ease the labor of workers. The annual saving is 83,000 rubles.

Model 1740RF3 NC semiautomatic machine with a 12-position tool head, automated tailstock and rest is designed for turning parts of complicated configuration (with diameters up to 400mm above the carriage and up to 630mm above the bed, with lengths of 1500 to 2000mm) in a chuck or on centers in series, small series and unit part production. The following can be done on the semiautomatic machine: turn cylindrical, conical and spherical surfaces; facing; cutting grooves; threading; drilling, etc. The high rigidity of the machine tool, high power of the main electrical motor (37 kw) and the high frequency of the spindle (16 to 1600 rev/min) make it possible to use hard alloy, as well as mineral-ceramic cutting tools. One installation implements both rough and finish machining of products. Automatic tool change is provided in the tool head.

The sloped arrangement of the semiautomatic machine makes access to the tool convenient, eases the setting up of the machined product and removing chips (by a worm conveyor). The tailstock and support are equipped with an automatic drive which makes it possible to machine the outside of shafts on centers. Lubrication of bedplate guides, carriage, screw gage, rest carriage and tailstock is by a dispenser, while the lubrication of the main drive is by circulation. The cooling system feeds the cooling liquid to each tool. NC makes it possible to obtain given dimensions and configuration of the machined product along two coordinates, as well as providing such technological instructions as the selection of the frequency and direction of spindle revolution, the approach and clamping of the rest, the movement of the tailstock, feeding the coolant, etc.

The model MR315 turning machine tool is a special NC machine designed for turning cylindrical, conical and spherical surfaces; facing; cutting straight and sloped grooves; machining internal surfaces of sleeves, flanges, disks; and cutting internal or external threads.

The machine tool consists of two independent parts with independent drives and control systems. Each spindle (diameter of clamping chuck is 315mm) is equipped with a four-sided 12-position turret head for installing tool holders which are readjustable outside the machine tool. Machining of parts is done along three technological arrangements: two like parts -- one on one side; one part -- on two sides; two different parts -- on one side.

The annual saving from the introduction of the machine tool is 27,400 rubles.

The industrial robot of the gantry type is designed to service automatic lines with one to three special NC machine tools with horizontal axis spindles operating in series and small series production. It loads, unloads and transports solid of revolution parts (shafts) weighing up to 160kg with high speed and to high precision, and provides for free access to the working zone.

The NC system controls the robot in the "training" mode with the following storing of the movement of two hands and its further reproduction (hand movement 1000mm, hand rotation 60° , highest speed of movement along the gantry 0.5 meter/sec). The robot is equipped with universal grips which make it possible to clamp shafts of any shape without readjustment. Its use saves 100,000 rubles annually.

The model A5214A automated machine tool is used for winding wave-like springs. It has a special adjustment that makes it possible to wind corrugated springs 2800mm long with an alternating pitch of steel wire with a square cross section, as well as wire of a round cross section. The use of the special adjustment increased the quality and reliability of the springs. Its introduction saved 1900 rubles annually.

A set of devices for pressure-molding of high pressure hose includes a device for removing rubber from the hose and a device for molding caps on high-pressure hose. The first device consists of a clamp with replaceable knives, a pneumatic cylinder and a heater which makes it possible to remove the upper layer of vulcanized rubber; the second device consists of a hydraulic station, a post and four clamping heads adjusted to a certain type-size of the hose, and a hydraulic drive. The pressure molding is done in special collets which are actuated by hydraulic cylinders.

A device for winding springs 30 to 180mm in diameter of wire (6 to 14mm in diameter) in the cold state is mounted instead of tool carriages on the model 1M63 screw-cutting lathe. The spring is wound according to the following arrangement: it is stretched, then bent (around a mandrel). The wire passes through two pairs of rollers located in mutually perpendicular planes.

The replacement of sliding friction by rolling friction reduces the torque on the machine tool spindle. The introduction of the device doubled the productivity of labor. The annual saving was 1200 rubles.

The URM-100 equipment was designed to reclaim used industrial oils to reuse them in production. It is serviced by two operators. The productivity of the equipment is 200 kg/hour and the reclaimed oil yield is 72 to 85 percent. Its introduction saves 120 tons of oil annually and increased the operating time of machine tools between repairs. The annual saving is 48,700 rubles.

Innovators and inventors contributed greatly to the success of the plant. During the three years of the 11th Five-Year Plan period, they introduced 1170 innovator proposals and 38 inventions with an economic effect of more than 1 million rubles. Here are several of the innovations they developed.

A device for removing dust and chips from difficult of access places (blind and deep holes, channels and grooves). The principle of its action is based on feeding air into the hole with simultaneous ejector suction of the chips. The annual saving per one device is 1000 rubles.

A system for attaching universal tools outside machine tools is used for NC lathes, hydraulic copying lathes and in automatic lines. Its special feature is the use of satellites (devices) for mounting the tools instead of tool holders that are large and heavy. A series of such satellites was developed. The seats for mounting the tools on machine tools are standardized. The satellite is made in the form of a steel casting adaptor with grooves for the tools. Their use makes it possible to increase the life of the tool, the stability of its dimensions and reduce the roughness of the machined parts; the operator's labor is eased when adjusting and servicing tools in the machine tool and outside it; metal consumption and labor-intensiveness of manufacturing tool fixtures are reduced; and the technological possibilities of machine tools are expanded. The annual saving is 130,700 rubles.

The transfer of machining steel and cast iron housing parts weighing up to 100 kg from universal equipment to model IR500MF4 and IR800PMFL NC processing centers facilitated freeing two workers, reduced the labor-intensiveness of machining to 0.667 of the previous and raised the quality of the machined parts. The annual saving is 7000 rubles.

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OTHER METALWORKING EQUIPMENT

HIGHLIGHTS OF MOSCOW METALWORKING EXHIBITION

Moscow FOREIGN TRADE in English No 7, Jul 84 pp 46-48

[Text] The recent exhibition of equipment, instruments and tools for the metal-working industry (Metal-working-84) in Moscow was designed to show the latest achievements in this key sector of the mechanical engineering industry, and promote mutually profitable cooperation of the Soviet Union with foreign countries.

The exhibition, the largest international review of the year, was sponsored by the All-Union Association Expocentr of the USSR Chamber of Commerce and Industry. Some 500 foreign firms and organizations from 20 countries and West Berlin displayed their exhibits in the Sokolniki and Krasnaya Presnya exhibition complexes on a total floor space of almost 27,000 square metres. To accommodate all the exhibits several extra pavilions had to be erected.

The number of participating companies and the size of the exhibition indicated that it was a significant and topical event. Also, it vividly demonstrated the important contribution of metal-working to the improved efficiency of the mechanical engineering industry, to the better quality and larger amounts of equipment it makes for other economic sectors, to higher

labour productivity and the economical use of materials and energy.

The exhibition enabled Soviet and foreign specialists to obtain information on the latest world achievements in metal-working and the world types and sizes of metal-cutting equipment—from lathes used in the watch, clock and instrument-making industries to giant vertical, turning lathes and plano-milling machines used in the heavy, power and metallurgical machine-building industries.

The Soviet Union was a leading exhibitor. This time it displayed some 500 pieces of equipment and machinery indicative of the technical achievements of the Soviet machine-tool industry and its export potentialities. The exhibits included quite a few new products that have no analogues in world industry.

The Soviet part of the Metal-working-84 exhibition was split into five sections: Metal-Cutting Equipment; Forge-and-Pressing and Casting Equipment; Instrumentation and Tools; Components; and Machining Attachments.

The Soviet industry today makes over 3,000 different types of metal-cutting lathes, among them ma-

chines with numerical programme control, which the Leningrad, Ivanovo and Ryazan associations manufacture, as well as multi-purpose lathes with automatic tool changing devices (processing centres) which substantially reduce auxiliary operation time and increase output efficiency several times.

Exhibits also included interesting machine modules that can be formed into automatic sections operated from a central computer control panel.

Higher efficiency and precision is another feature of Soviet-made equipment of which the very adaptable Talka-500 system from the Ivanovo works and the self-reading line manufactured by the Moscow Stankoagregat plant are good examples. Experts say this equipment is very promising as it reflects the world trend towards the application of robotics in industry.

The Krasnyi Proletari plant (Moscow) exhibited an improved modified model of a new generation turning lathe with a storing capacity for the processed parts and a robot for loading and unloading the machine. Microprocessors with on-line and fixed memories control the lathe.

There was always a crowd of interested visitors and specialists around the stand displaying a robotized turning complex and a lathe complex. This Soviet-made equipment is highly economic and relieves operators from monotonous and heavy manual work.

Among the unique pieces of equipment for comprehensive machining of large parts for steam and gas turbines, casings, crankshafts, etc., particularly interesting was, for example, a combination ma-

chine tool developed by the Novosibirsk plant for machining heavy-duty marine diesel engines bearing beds alternating the following operations: planing, milling, boring and grinding, all in one setting.

The Soviet forging and pressing equipment on display included a press with a robotized stamping mechanism and a fully mechanized aluminium alloy casting machine. Visitors were particularly impressed by the equipment which used electrical, physical and chemical processes as the machining medium, for instance, a laser device to cut such superhard materials as diamonds, corundum and ceramics.

New designs and types of up-to-date tools, meeting the highest foreign market standards, were also displayed.

Soviet exhibits were striking proof of the high level of development of the USSR engineering industry and of the export potentialities of the All-Union Foreign Trade Association Stankoimport which sells products of the Soviet machine-tool and bearing industries throughout the world.

Stankoimport is one of the world's largest specialized agencies which has been dealing with exports and imports of metal-working equipment and tools for more than 50 years. At present it trades with partners in almost 90 countries.

The advances of Soviet engineering enable Stankoimport to continually extend its export list which includes today, along with the universal type Soviet-made machines known to many countries, new sophisticated special heavy-duty equipment whose technical standards match those of leading foreign firms.

The Association's main customers are foreign trade organizations in the socialist countries which purchase large volumes of specialized equipment for their mechanical engineering, heavy and power industries. In their turn these organizations deliver to the Soviet Union through Stankoimport large amounts of special lathes and automatic lines for the bearing, electro-technical, auto, tractor and other industries.

The GDR, Hungary, Czechoslovakia, Poland, Romania and Yugoslavia put much of their high precision equipment on show at the Metal-working-84 exhibition, including turning, milling, grinding and hydraulic machine tools, equipment for assembling radial ball bearings, welding machines, robotized lathes, processing centres for machining parts of different sizes, etc. The high technical standards of their products result from the multilateral cooperation in machine-tool building based on specialized and cooperated manufacture.

Specialized and cooperated manufacture plays an important part in Stankoimport's cooperation with the socialist countries' foreign trade organizations. For example, intensive joint work is under way between Soviet machine tool builders and those in the GDR and Czechoslovakia, to improve the design and construction of modern metal-cutting machine-tools with numerical programme control. As the result of this cooperation the Soviet-made ones are being used effectively by GDR and Czechoslovak enterprises, and those made in the GDR and Czechoslovakia are in successful operation at enterprises in various parts of the Soviet Union.

Under respective agreements on specialized and cooperated manufacture in machine-tool making industry the Soviet Union and Hungary concentrate their efforts on making various kinds of metal-cutting lathes, forges and presses, hydraulic installations and different tools; Bulgaria manufactures for CMEA members material-handling facilities for automatic lines, devices for removing chip, etc.; Poland specializes in making precision chucks and electromagnetic clutches.

Good progress has been made in cooperation with Yugoslavian enterprises.

An eye catcher at the exhibition was a heavy-duty processing centre made jointly with the GDR specialists that has nothing to match it in the world machine-tool building industry.

Displayed also in a Soviet pavilion was a turret lathe (processing centre) jointly designed and developed by Soviet and Czechoslovak engineers.

Leading Western manufacturers and business firms were also well represented at the exhibition. They are all Stankoimport's trading partners. Many of them are assisting in developing cooperated manufacture of metal-cutting machine tools with numerical programme control, tool-milling machines and highly productive tools. The FRG, Switzerland, France, Italy, Austria, Japan and the USA were a few of the countries among the largest exhibitors.

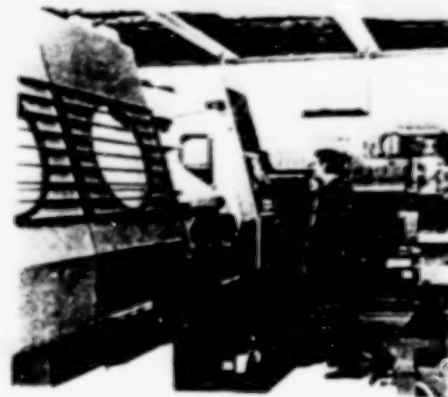
Companies from the following countries are most active importers of Soviet metal-cutting equipment: Austria, Brazil, Great Britain, Greece, India, Italy, Canada, Finland, Norway, France, the FRG, Sweden, Japan, etc.



N.A. Tikhonov, Chairman of the Council of Ministers of the USSR, G.A. Aliyev, First Deputy Chairman of the Council of Ministers of the USSR, A.K. Antonov and L.V. Smirnov, Deputies of the Chairman of the Council of Ministers of the USSR, viewing the Metal-working-84 exhibition. B.V. Balmont, Minister of the Machine-Tool and Instrument-making Industry (right), describing an exhibit.



The GDR's exposition.



Czechoslovakia's exposition

During the exhibition press conferences and a seminar were held as well as specialists' reports and discussions about problems and the future development of the machine-tool industry heard.

Representatives of companies and enterprises met daily at the exhibition's commercial centre to discuss business and sign contracts with representatives of Stankoimport and other Soviet foreign trade associations.

The Metal-working-84 exhibition has been a success both as an extensive review of scientific and technological achievements and as another step towards greater, mutually profitable international cooperation.

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